

ECCENTRIC CONTRACTIONS IN THE REHABILITATION OF LATERAL ELBOW TENDINOPATHY: LITERATURE REVIEW

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ABSTRACT

Lateral elbow tendinopathy (LT) is the most common chronic painful condition affecting the elbow in general population. Research has shown that an eccentric exercise program can be effective modality for treating tendinopathies. The purpose of this review was to determine the effects of eccentric contractions (EC) in comparison to other types of contractions and other therapeutic approaches. Searches were performed using the electronic databases Medline, Scopus and Web of Science. The basic selection criterion was a research methodology in which at least one group of subjects used eccentric contractions in comparison to other methods of contractions or therapy. In conclusion, eccentric contractions are useful method of treating LT in 12 week period. However, it cannot be stated with certainty whether EC exercises are more or less effective than other forms of therapeutic exercises or specific physiotherapeutic techniques.

Keywords: lateral epicondylitis; lateral epicondylalgia; tennis elbow; elbow tendinopathy; eccentric contractions; physical therapy; exercise

Introduction

Lateral elbow tendinopathy (LT) known as “tennis elbow”, is one of the most often occurring syndromes that affect the soft tissue of the hand (Labelle et al., 1992; Noteboom et al., 1994). The incidence is 1–3% in the general population aged 35 to 54, with no gender prevalence, and is associated with overuse of the fist, forearm and elbow in activities such as manual labor and tennis (Gruchow et al., 1979; Shiri et al., 2006). Clinically, LT is defined as the pain occurring around the lateral epicondyle during the contraction of fist and finger extensor muscles (Harrington et al., 1998; Dimitros, 2016). The pain can be reproduced during physical examination by palpation of the common tendon of the extensor and contraction with resistance of the extensor of the fist and / or middle finger as well as by clenching of the fist (Coombes et al., 2015; Dimitros, 2016). However, defining LT exclusively as mechanical stress-induced tendinopathy is not suitable for explaining the broad clinical image of LT, so more extensive models are being developed lately that include psychosocial factors with new insights into neurophysiology of the pain (Bordachar, 2019).

Numerous studies have confirmed the success of conservative treatment of LT (Nirschl, 1992; Pienimäki et al., 1996; Martinez – Silvestrini, 2005; Croisier et al., 2007; Marcolino et al., 2016; Stasinopoulos and Stasinopoulos, 2017), while the systematic review papers substantiate it as well (Trudel et al., 2004; Cullinane et al., 2014; Menta et al., 2015). Conservative treatment is often multidimensional, while the exercise program is its most often included component (Gruchow et al., 1979; Noteboom et al., 1994; Dimitros, 2016). Exercise programs involving eccentric contractions (ECs) have proven successful due to the potential beneficial effects of stretching, elongation and increase

in tendon strength (Murtaugh and Ihm, 2013). Such work modalities are becoming increasingly popular in the rehabilitation of tendinopathies as they are thought to achieve more successful treatment than other exercise modalities (Woodley et al., 2007; Raman et al., 2012). The use of EC in the treatment of LT is not fully understood at present, standardized protocols are not defined, while the results are often contradictory. Nevertheless, the articles reviewed so far indicate promising results in favor of EC as the choice of treatment for LT (Marillas et al., 2008; Cullinane et al., 2014).

The aim of this review paper / report is to analyze the most recent findings on the efficiency of EC as a therapeutic intervention in the treatment of LT compared to other methods, by reviewing the literature to date.

Methods

The Medline, Scopus and Web of Science databases were researched. Existing review papers and major publications were used to select search keywords (lateral epicondylitis, lateral epicondyle, lateral epicondylgia, tennis elbow, elbow tendinopathy, intervention, management, treatment, rehabilitation, physiotherapy, physical therapy, exercise, strengthening, eccentric and resistance). Research was conducted in February 2019. Out of the total number of papers found, the basic selection criterion was a research methodology in which at least one group of subjects used EC in comparison to other methods of exercise or therapy, patients were diagnosed with LT, there was at least one criterion of functionality or incapacity. The exclusion criterion was the use of steroid injections before or during the study. Out of the total number of papers found, 13 papers were included in the analysis according to the criteria listed above.

Results and discussion

A total of 13 papers were included in the analysis, which compared the efficiency of EC with other types of exercises or other physical methods for improving function in LT. Of the total number of studies, 11 studies (Martinez – Silvestrini, 2005; Nagrale et al., 2009; Söderberg et al., 2012; Viswas et al., 2012; Peterson et al., 2014; Sevier and Stegink Jansen, 2015; Stasinopoulos and Stasinopoulos, 2017; Lee et al., 2018) were randomized controlled clinical trials, one study was a nonrandomized clinical trial (Croisier et al., 2007) and one was a cohort study (Svernlöv and Adolfsson, 2001). Out of 13 studies, two compared ECs with stretching exercises, three compared ECs with concentric exercises, three compared ECs with Cyriax therapy, one study compared ECs with isotonic contractions, one study compared ECs with astym therapy, one study compared EC extensor exercises with shoulder stabilization exercises, one study compared EC with standard physical therapy, one study compared the addition of EC to stretching exercises, one study compared the addition of EC to the physical therapy protocol. Due to the variety of the interventions and the measurement variables used, the results will be discussed narratively.

Comparison of EC and Other Forms of Treatment

In their study Svernlöv et al. (2001) compared EC exercises with tolerant pain threshold with stretching exercises over a 15-week period. They determined a positive subjective change in functionality in favor of EC versus stretching exercises. Both groups progressed in reducing pain, with greater progress in the EC group at maximum strength. Martinez et al. (2005) also compared EC of an extensor with the addition of pain-free stretching, concentric extensor exercises with the addition of stretching and only stretching exercises in three different groups of subjects. No statistically significant differences were obtained between the groups in any of the variables examined (VAS, maximum painless fist grip strength, subjective sense of functionality). ECs appear to have a more favorable effect than stretching exercises in treating patients with LT, but more research is needed with a longer rehabilitation process to determine clearer causes of differences and better guidelines.

Four studies examined differences in EC rehabilitation and specific manual methods of physiotherapy in the treatment of LT (Stasinopoulos and Stasinopoulos, 2006; Nagrale et al., 2009, Viswas et al., 2012; Savier and Stegink - Jansen, 2015). Stasinopoulos and Stasinopoulos (2006) concluded

that ECs have a more favorable effect than the Cyriax method in reducing pain and increasing fist grip strength. Viswas et al. (2012) also compared the two methods listed and obtained similar results in pain reduction, while not examining the strength. Nagrale et al. (2009) obtained opposite results and determined that Cyriax method had a greater effect on increasing strength and reducing pain connected with EC. ECs were performed with pain in all three studies, rehabilitation duration was equal (4 weeks) and exercise protocol very similar. Such contradictory results can be attributed to the examiner bias, but also the quality of manual therapy, which can vary considerably among therapists. Due to contradictory results, we cannot conclude whether EC therapy is more successful than the Cyriax method. Sevier and Stegink – Jansen (2015) examined the difference between the standard physical therapy protocol and EC with astym protocol. They obtained an improvement in all parameters using the astym protocol compared to standard recommended protocol. Additional studies are needed to avoid examiner bias. A potential limitation of these studies is the need for additional therapist education in order for protocols to be implemented.

Wen et al. (2011) compared a group performing ECs with a group performing stretching exercises with the addition of iontophoresis and ultrasound. The authors failed to find significant differences between the groups, which is not in line with the previous findings which define EC as a more successful method of LT therapy than conventional physical methods.

Only one study (Lee et al., 2018) compared EC on fist extensors with an intervention on some other anatomical body location, specifically the shoulder. EC exercises on fist extensors were compared with shoulder stabilization exercises. The group performing shoulder stabilization exercises performed better in fist grip strength and trapezius muscle pressure sensitivity, while the other variables were the same in both groups (lateral epicondyle sensitivity and pain). These results point to the multidimensionality of LT syndrome and tell us that the problem could be observed as a consequence of multiple factors, and the treatment and interventions analyzed in areas beyond the pain site itself.

Comparison of EC with Other Types of Contractions

In a review paper by Raman et al., (2012) authors concluded that the previous studies suggested that an isotonic eccentric modality of work is most favorable as a choice of exercises for LT. Furthermore, they recommended a progressive increase in load over a period of 6 to 12 weeks. Surveys conducted after the review paper offered contradictory results. Martinez – Silvestrini et al. (2005) failed to determine differences in concentric, EC and stretching exercises in reducing pain over a period of 4 weeks. Peterson et al. (2014) found an increase in strength and a decrease in pain in a group performing EC compared to a group performing concentric contractions. Stasinopoulos and Stasinopoulos (2017) compared three groups. One group performed EC, the other a combination of EC and concentric contractions and a third EC, concentric and isotonic contractions. The third group showed the greatest progress in reducing pain and increasing strength which is in line with the earlier findings. Given the results, it can be concluded that it is still not certain whether ECs are a superior mode of exercise compared to other modalities in LT.

EC as an Addition to Standard Protocols

Croisier et al. (2007) compared passive methods of standard physical therapy (TENS, ultrasound, stretching, cross friction massage) without and with the addition of EC. The group performing EC showed progress in all measuring variables (VAS, fist grip strength), so the authors concluded that the addition to the exercise was a mandatory part of the LT treatment protocol. Stretching exercises and wearing a suspensor also produced significantly less progress than a combination of the above listed in addition with EC (Wen et al., 2011). The trend of these results is in line with the earlier findings, suggesting that LT rehabilitation should also include active exercise.

Conclusion

ECs are a useful treatment in treating LT. The 12-week EC exercise protocol achieves beneficial effects on reducing pain and increasing function. However, it cannot be stated with certainty whether EC exercises are more or less effective than other forms of therapeutic exercises or specific physiotherapeutic techniques. People who overuse flexor and fist grip muscles are known to be at increased risk of LT, and all known studies up to date have focused interventions exclusively on the arm extensor muscles where symptoms appear. The involvement of the flexor arm muscles in research would potentially deepen the understanding of how LT is formed and treated. Future research projects that would compare different forms of exercise, different exercise volumes and different forms of contraction would contribute to a better understanding and standardization of exercise protocols in LT.

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